Space Weather Forecast

Issued on Thursday, 21 March 2024 at 13:24 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely (R1-R2 Radio blackouts), slight chance of strong flares (R3 blackouts). Chance of G1/Minor Storm intervals from Coronal Mass Ejection arrivals Day 1 (21 Mar).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Activity has been Moderate, with the largest flare peaking at 20/2255 UTC from the largest region in the southeast. This is one of the main regions of interest on the disc and has a large number of smaller spots, showing a couple of areas of magnetic complexity. Another region of interest is in the northeast (likely a region from the previous rotation which gave three Strong flares, including the largest of the solar cycle so far) which has a large main spot with clear magnetic complexity. A new region in the southwest has grown rapidly over the past day, but flare activity has been minimal so far. The remaining regions appear stable or showing slight decay.

No new Earth directed Coronal Mass Ejections (CMEs) have been observed in the last 24 hours.

Solar Wind / Geomagnetic Activity: Solar winds have been at background levels throughout the last 24 hours, around 330-360 km/s. Interplanetary Magnetic Field (IMF) was weak at first, but increased to Moderate with the arrival of a CME. The north-south component varied weakly at first, then more strongly after the CME arrival. Geomagnetic activity was Quiet to Unsettled (Kp1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely with a slight chance of becoming High with any isolated Strong flares, mostly due to the two regions in the east, and the newly formed region in the southwest.

Solar Wind / Geomagnetic Activity: A complex eruption on 17 Mar saw two possible Earth-directed CMEs. One shock has been observed, but it is unclear which CME was responsible, and therefore if there will be a further shock in the coming hours. A coronal hole fast wind may cause a further enhancement later on Day 4 (24 Mar).

Geomagnetic activity is expected to be Unsettled at first, with a chance of Active or G1/Minor Storm intervals (Kp4-5) in association with the CME effects. Effects are then likely to decline into Day 2, becoming largely Quiet for Days 2-4 (22-24 Mar). Towards the end of Day 4 a coronal hole fast wind may connect with Earth, with geomagnetic activity possibly becoming Unsettled-Active (Kp3-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain around background levels, with a slight chance of enhancements.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	40	10	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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